

REMARKS

The Office examined claims 1-8 and rejected claims 1-8. With this paper the claims are unchanged.

Reminder of petition to expunge

As directed in the Office action, applicant hereby reminds the Examiner that a petition to expunge a reference was filed in this case on Jan. 14, 2003, and awaits close of prosecution before being acted on. The reference in question includes proprietary information of the assignee in the present case, and was provided in an IDS by mistake.

Rejections under 35 USC §103

At paragraph 4 of the Office action, claims 1-8 are rejected under 35 USC §103 as being unpatentable over "Enhanced accuracy GPS navigation using the interacting multiple model estimator" by Lin et al in view of U.S. Pat. No. 5,650,785 to Rodal.

As explained in response to the previous Office action, all of the claims of the application include what is called here a *computation-in-power-saving-mode* limitation, namely that a predetermined number of solutions of the state of motion of the receiver are performed at least once during a time in the partial duty cycle when selected receiver components are powered off. The Office action concedes (in paragraph 4) that Lin fails to teach or suggest such a limitation, and so relies on Rodal for such a teaching.

Rodal discloses (col. 4, ll. 5-17) a ranging receiver having a microprocessor system 24 that measures a signal strength from a correlation signal and determines a duty cycle factor that reduces the signal strength (of the signal from the ranging system satellites) to what is supposed/ estimated to be the minimum needed for a reliable location fix. The duty cycle factor

and information for a predetection interval (the interval during which the IF signal derived from signals received from one or more GPS satellites is correlated to an internally generated replica signal) are provided in a power control signal to an on/off modulator 30. The on/off modulator 30 on/off modulates the power supplied to one or more RF circuits, including, an optional preamplifier 14, a frequency downconverter 16, and a quantizer 20.

Rodal discloses--beginning at col. 4, line 40--two variations of an on/off (power) modulator. In each variation the on/off modulator 30 adjusts the duty cycle from close to 100%, when the GPS satellite signal is weak, downward to as low as 4% when the GPS satellite signal strength is strong in order to provide the minimum signal strength for a valid location fix. In the first variation, the on/off modulator 30 adjusts the off time duration to adjust the duty cycle after selecting an on/off cycle time duration in the range of 25 ms to 10 microseconds. In the second variation, the on/off modulator 30 adjusts the on/off cycle time duration after selecting an off time duration in the range of 1 ms to 1 microseconds. At col. 4, line 54, Rodal discloses an optional pseudorandom sequence generator 36 that generates a pseudorandom signal and issues the signal to the on/off modulator 30. The on/off modulator 30 uses the pseudorandom signal to vary the off time duration (in a range of 10% to 50%), to vary the on/off cycle time duration (in a range of 10% to 50%), or to vary both. It is explained at col. 5, line 5, that,

The use of the pseudorandom sequence improves the reliability of the correlation process when the operating power to the RF section is on/off modulated by eliminating the possibility of synchronization of the on/off modulation and other signals within the GPS receiver 10.

Thus, Rodal teaches away from turning on and off power to selected components according to a regular schedule in which some

computations are routinely performed when the power is turned off.

By contrast, as explained at page 8, beginning line 21, the invention is based on periodically (i.e. according to a regular schedule) shutting down a GPS receiver's low-level hardware used to acquire, track, and process ranging signals from the GPS satellites (including extracting navigation data and pseudorange information from the ranging signals), and estimating the user's position, velocity and time (PVT) using a motion-modeling filter, such as the Interacting Multiple Models (IMM) filter, to provide PVT solutions both during shut-down and during power-on, which can then provide acceptably accurate PVT solutions even during shut-down. The estimated PVT solutions are used not only for providing continuous position information for the user, but also for speeding up GPS satellite signal reacquisition by using the estimated PVT as the basis for very accurate initial estimates of code and carrier phase.

Thus, the *computation-in-power-saving-mode* recited in all of the claims of the application differs fundamentally from the strategy for power savings taught by Rodal: in the invention, computations are performed during power-off mode that are used for providing PVT solutions during both power-off mode and power-on mode, whereas Rodal teaches a strategy of turning on and off power to the receiver components of a ranging receiver so as to provide the minimum signal strength required for a reliable fix, with the power turned on and off totally independently of when computations for PVT solutions are performed.

The Office action asserts that Rodal does teach the *computation-in-power-saving-mode* feature of the claimed invention (i.e. that a predetermined number of solutions of the state of motion of the receiver are performed at least once during a time in the partial duty cycle when selected receiver components are

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powered off), referring to col. 1, line 66 to col. 2, line 67),
which reads:

It is therefore an object of the present invention to
provide a GPS receiver having a low power consumption while
the GPS receiver continues to correlate a GPS satellite
signal and to provide a location fix to a user.

Applicant respectfully submits that such a vague statement
applies to many different implementations of a low-power
consuming GPS receiver, including even one that never makes use
of an on/off duty cycle but simply relies on low-power consuming
components, and so cannot fairly be said to be a disclosure of
the *computation-in-power-saving-mode* limitation recited in all of
the claims of the application.

Accordingly, applicant respectfully requests that the
rejections under 35 USC §103 of claims 1-8 be reconsidered and
withdrawn.


Conclusion

For all the foregoing reasons it is believed that all of the
claims of the application are in condition for allowance and
their passage to issue is earnestly solicited. Applicant's
attorney urges the Examiner to call to discuss the present
response if anything in the present response is unclear or
unpersuasive.

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